

## **CLAIMS:**

1. A hybrid propulsion system comprising:  
a liquid fuel section containing an aqueous solution of hydrogen  
5 peroxide and a solid fuel section containing a fuel grain; and  
an injector system located between the liquid fuel section and the solid  
fuel section, said injector system introducing a stream of hydrogen peroxide or  
decomposed hydrogen peroxide at elevated temperature into the solid fuel  
section to effect combustion of the fuel grain.  
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2. The hybrid propulsion system of Claim 1 in which the hydrogen  
peroxide is in a concentration of 50-98 percent by weight.
3. The hybrid propulsion system of Claim 2 in which the concentration of  
15 hydrogen peroxide is in the range of 70-90 percent by weight.
4. The hybrid propulsion system of Claim 1 in which the injector system  
contains a catalyst for decomposition of hydrogen peroxide to produce a  
stream of decomposed hydrogen peroxide at elevated temperatures.  
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5. The hybrid propulsion system of claim 4 in which the catalyst is  
selected from a group consisting of platinum, silver, platinum or silver coated  
nickel, and nickel coated with a combination of silver and samarium nitrate.
- 25 6. The hybrid propulsion system of claim 1 in which the injector system  
decomposes said stream of hydrogen peroxide by use of heat.
7. The hybrid propulsion system of claim 1, in which the solid fuel section  
contains a catalyst to decompose hydrogen peroxide, introduced to said solid  
30 fuel sections by said injector.

8. The hybrid propulsion system of Claim 7 wherein said catalyst in said solid fuel section is selected from the group consisting of platinum, silver, platinum or silver coated nickel, and nickel coated with a combination of silver and samarium nitrate

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9. The hybrid propulsion system of Claim 1 in which the aqueous solution of hydrogen peroxide additionally contains at least one of ammonium dinitramide and hydrazinium nitroformate.

10 10. The hybrid propulsion system of Claim 8 in which the amount of ammonium dinitramide or hydrazinium nitroformate is in the range of 5-50% by weight.

15 11. The hybrid propulsion system of Claim 1 in which the aqueous solution of hydrogen peroxide additionally contains an oxidizer in solution or in suspended particulate form.

20 12. The hybrid propulsion system of Claim 9 in which the oxidizer is selected from the group consisting of chlorates, perchlorates and nitrates.

25 13. The hybrid propulsion system of claim 10, in which the oxidizer is selected from the group consisting of ammonium perchlorate and ammonium nitrate.

30 14. The hybrid propulsion system of Claim 11 in which the aqueous solution of hydrogen peroxide additionally contains stabilizers such as chelating agents in order to increase storage stability.

15. The hybrid propulsion system of Claim 1 in which the fuel grain additionally contains a metal.

16. The hybrid propulsion system of Claim 14 in which the metal is a hydro-reactive metal.

17. The hybrid propulsion system of Claim 16 in which the hydro-reactive metal is selected from the group consisting of aluminum, magnesium, boron, beryllium, lithium and silicon, mixtures thereof, or hydride forms thereof.

5 18. The hybrid propulsion system of Claim 14 in which the metal is in the form of an alloy.

19. The hybrid propulsion system of Claim 1 in which the fuel grain contains a solid oxidizer.

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20. The hybrid propulsion system of Claim 19 in which the solid oxidizer is selected from the group consisting of ammonium perchlorate, ammonium nitrate, hydrazinium nitroformate, ammonium dinitramide, hydroxylammonium nitrate, hydroxylammonium perchlorate, nitronium perchlorate and mixtures thereof.

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21. The hybrid propulsion system of Claim 1 in which the fuel grain contains an energetic filler.

20 22. The hybrid propulsion system of Claim 21 in which the energetic filler is selected from the group consisting of cyclotrimethylene trinitramine, cyclotetramethylene tetranitramine, hexanitroisoazowurzitane, and mixtures thereof.

25 23. The hybrid propulsion system of Claim 1 in which the fuel grain contains an energetic plasticizer.

24. The hybrid propulsion system of Claim 22 in which the energetic plasticizer is selected from the group consisting of butanetriol trinitrate, trimethylolethane trinitrate, triethyleneglycol dinitrate, glycidyl azide plasticizer and mixtures thereof.

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25. The hybrid propulsion system of Claim 1 in which the fuel grain contains an energetic polymer.

26. The hybrid propulsion system of Claim 24 in which the energetic polymer is selected from the group consisting of glycidyl azide polymer, bis-azidomethyloxetane/azidomethyl-methoxetane copolymer and nitramethyl-methoxetane polymers, and mixtures thereof.

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27. The hybrid propulsion system of Claim 1 in which the fuel grain contains a ballistic or processing modifier.

28. The hybrid propulsion system of Claim 1 in which the fuel grain  
10 contains a hydrogen peroxide decomposition catalyst.

29. The hybrid propulsion system of Claim 28 in which the decomposition catalyst is selected from the group consisting of potassium permanganate and manganese dioxide.